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Assessment of Amniotic Fluid Volume Disorders in Third Trimester Among Pregnant Saudi Diabetic

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Assessment of amniotic fluid volume (AFV) in pregnancies is important for maternal and fetus health spatially in diabetic cases due to its complications. This study aimed to determine the AFV disorders in 3rd trimester with relation to age, diabetic type, diabetic status and mode of delivery using ultrasound. This retrospective study conducted at Taif hospitals during 2019. The study data included 94 Saudi diabetic pregnant who underwent ultrasound measurement (maximum vertical pocket) in the 3rd trimester. The data was gained from the Picture Archiving and Communication system (PACS) and analyzed by SPSS (21.0.0.0). The AF disorders were detected in (22%) of sample size. (17%) of them was polyhydramnios and (5.4%) was oligohydramnios. The more affected age groups were 30-39y. AF disorders were higher in gestational diabetes mellitus (GDM) (16%) than diabetes mellitus (DM) (6.4%). Most of the patients with AF disorders delivered by Cesarean section (CS), while no patient with oligohydramnios delivered by vaginal delivery. In conclusion, the diabetic patient with AF disorder has more risk to deliver by (CS). AF disorders are higher in GDM patient than in DM patient.

Keywords: Diabetes mellitus, AF, MVP, GDM

INTRODUCTION

The amniotic fluid (AF) plays a critical role in the normal development of a fetus. (Xiao-yan Sha, et al. 2011). It protects the developing baby by cushioning against blows to the mother's abdomen, allowing for easier fetal movement and promoting muscular/skeletal development. (Payel Ray¹, *ET AL, 2017) In addition, serves to facilitate the exchange of nutrients, water, and biochemical products between mother and fetus. (Elsafi et al. 2013). Amniotic fluid is in the amniotic sac. It is

generated from maternal plasma and passes through the fetal membranes by osmotic and hydrostatic forces. (Mohammed et al. 2014)

Diabetes has more complication on maternal and fetus life, and the measurements of amniotic fluid volume in pregnancies are important for maternal and fetus health wellbeing and the pregnancy outcome. (Richard L. Fischer, MD, 2008,)

There are two types of AFV disorder when it is increase is described as polyhydramnios, the values above 8 cm when is measured vertically in

the deepest amniotic fluid pocket.(Ahamza and D.H.E.R.R,2013,Aniosdweleh,2017) .While it is too little describes as oligohydramnios and the values below 2 cm when is measured vertically in the deepest amniotic fluid pocket.(Ahamza and D.H.E.R.R,2013,Aniosdweleh,2017)

The assessment of amniotic fluid volume (AFV) is an essential component of the real-time ultrasound evaluation for fetal well-being. .(Mohammed et al.2014). It is noninvasive, does not use ionizing radiation and has an excellent safety record. There is two common techniques that is used to assess amniotic fluid.The maximum vertical pocket and amniotic fluid index. N idris, S f wong, et al. 2010, Elisabetta Buscarini, Harald Lutz and Paoletta Mirk.2013) The maximum vertical pocket is simplicity, making it the most commonly used method in practice.(Ahamza and D.H.E.R.R,2013)

The relationship between amniotic fluid disorders and diabetes has been observed before in several studies and resulted with different findings. Multiple studies done on polyhydramnios and was found to be associated with diabetes by (56%) in some studies. .(Mohammed et al.2014). Other studies were done on oligohydramnios. But there are no studies that combine between them. And still there is not enough study that classified the findings according to controlled and uncontrolled diabetic pregnant. In Saudi Arabia there is no studies done before about the relationship between amniotic fluid disorders and diabetes.(Ahamza and D.H.E.R.R,2013)

MATERIALS AND METHODS

This retrospective study has included 94 Saudi pregnant women with controlled or uncontrolled diabetes (diabetes mellitus, gestational diabetes) and (AFV) disorders at 3rd-trimester of pregnancy. The age ranged between 20-50 years. The 1st and 2nd trimester of pregnancy were excluded. The data was collected in the period from 2019 at Taif hospitals in Kingdome of Saudi Arabia (KSA) .Al-Hada Armed Forces Hospital, King Faisal hospital and Prince Mansour Armed Forces Hospital in Taif. The Ethics approval was obtained from the Institutional Review Board (IRB) of the Armed forces hospitals-Taif region. All the patients underwent to noninvasive real-time ultrasound measurement by the largest pocket method.

Ultrasound preparation and technique (protocol):

The ultrasound real-time examination was carried out after instructing the patient to empty her bladder. The examinations were performed by Philips US machine with a convex 3,5 MHZ probe. The patient was asked to lie down in supine position. uterus was arbitrarily divided into four quadrants using linea nigra as a vertical line and a transverse line passing through umbilicus as described by phelanetal. The transducer was placed in each of these quadrants in sagittal plane perpendicular to patient's abdomen and maximum depth of amniotic fluid in an area with free of an umbilical cord and fetal parts. It's applied for the early detection of fetal growth restriction.(Enjyopregnancyclubcom,2017,Shripad Hebbar, * et al.2015)

The normal range is between 2cm and 8cm less than 2cm indicative of oligohydramnios and more than 8cm indicative of polyhydramnios. It had been collected from Picture Archiving and Communication in Medicine (PACS) using data collection sheet.(Sabrina Q.Rashid,2013)

RESULTS AND DISCUSSION

This cross-sectional hospital-based study used the noninvasive real time ultrasound measurement to measure (AFV) in the third trimester real-timer among Saudi diabetic pregnant. Also,Demonstrate the relationship between polyhydramnios, oligohydramnios, and diabetes. The Analyze study findings depend on age, controlled and uncontrolled diabetic pregnant. This study was applied to 94 diabetic pregnant patients (pt) during 2019.

The study summarized the age of diabetic patients in Table (1), the minimum age was 20y, maximum age was 50y and the more affected age group of diabetic was 30-39y. In Elsafi Ahmad abdalla study, the ages were 15-44 y, the more affected age group of diabetic pregnant women was from 20-24 and 30-34.[1] The difference between studies may be due to the difference in sample size.

Table. I Freqency of each age groups.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20-29y	20	21.3	21.3	21.3
30-39y	54	57.4	57.4	78.7
40-50y	20	21.3	21.3	100.0
Total	94	100.0	100.0	

The study demonstrated age groups with AFV

in Figure (1). In the normal AFV the group 20-29 was (14.9%), the group 30-39 was (43.6%) and group 40-50 was (19.1%). In the polyhydramnios the group 20-29 was (5.3%), the group 30-39 was (9.6%) and the group 40-50 was (2.1%). While oligohydramnios, the group 20-29 was (1.1%), the group 30-39 was (4.3%) and the group 40-50 was Zero. This study noticed the group 30-39 more affected in AFV disorder maybe due to the aging process. There are no previous studies showing the relationship between ages with AFV in diabetic pregnant women to discuss with the study results.

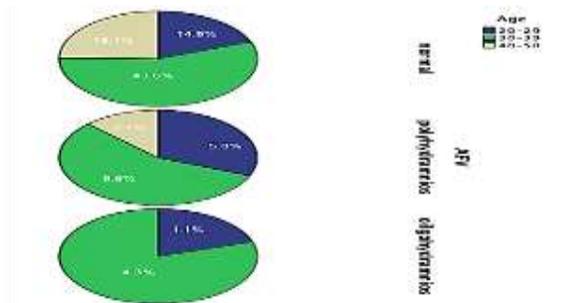


Figure.1 Different age groups with amniotic fluid volume(AFV).

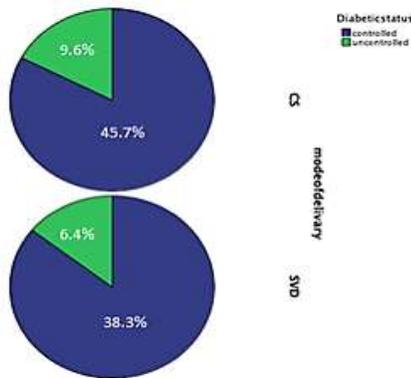


Figure.2 The diabetic status with the mode of delivery.

This study explained the mode of delivery according to diabetic status by Figure (2). The CS (45.7%) was controlled and (9.6%) was uncontrolled. On the other hand, during the SVD (38.3%) was controlled and (6.4%) was uncontrolled. This study noticed the uncontrolled diabetic pregnant women delivered by CS more than SVD, maybe to avoid complication for mother and fetus. There are no previous studies showing the relationship between mode of delivery according to diabetic status in diabetic pregnant women to discuss with the study results.

The study showed AFV according to diabetic

types Figure (3). In the normal AFV (60%) with GDM while (17%) with DM. In the polyhydramnios (11.7%) with GDM while (5.3%) with DM. In the oligohydramnios state (4.3%) with GDM while (1.1%) with DM. That is mean that AFV disorder with GDM by (16%) was more than DM by (6.4%). Maybe the pregnant doesn't know she has GDM and she was uncontrolled. And in AFV disorder with diabetes the polyhydramnios was more than oligohydramnios by (17%) vs (5.4%) so maybe the polyhydramnios cases the GDM In A.Hamza.[3] Mohamed Adam's study showed in normal AFV was 8 with GDM and 33 with DM, in polyhydramnios was 27 with GDM and 29 with DM. In oligohydramnios was 1 with GDM and 2 with DM.[2] Mohamed Adam study disagreed with our study, their study noticed that pregnant women with DM were more than GDM. The difference between the studies was that measured AFV in their study was using amniotic fluid index (AFI) and it was in second and third trimesters.

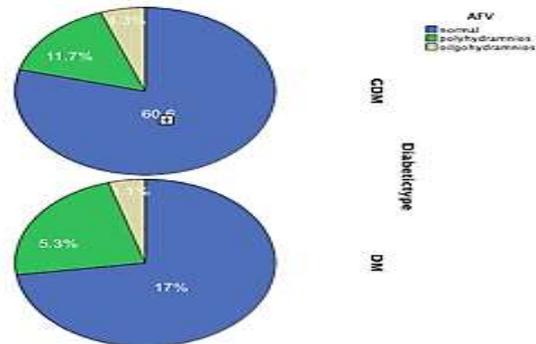


Figure.3 The AFV in relation with the Diabetic type.

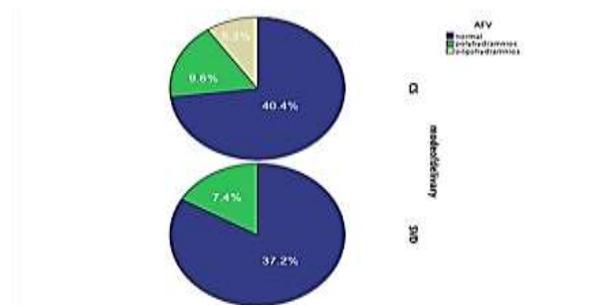


Figure.4 The percentage of Amniotic fluid volume with Mode of delivery.

The study demonstrated the mode of delivery according to AFV in Figure (4). Where (40.4%) CS delivery was normal AFV, (9.6%) was polyhydramnios and (5.3%) was oligohydramnios. While (37.2%) SVD delivery was normal, (7.4%) was polyhydramnios and Zero oligohydramnios. The diabetic pregnant women with AFV disorder

delivered by CS more than SVD which may be due to fetus choked by excessive fluid or to avoid after birth complication for a fetus or mothers. N.IDRIS study agreed with our study where in their results the patient with polyhydramnios delivered by CS more than SVD by (83%) vs (62%) in patient with normal AFV.^[7] N.IDRIS study noticed the patient with polyhydramnios delivered preterm by (54.2%).^[7] And disagreed with our study because didn't compare between AFV according to diabetic types and mode of delivery, it only describes polyhydramnios in relationship to DM and mode of delivery. There are no previous studies showing the relationship between the mode of delivery with oligohydramnios in diabetic pregnant women to discuss with the study results. There have been previous studies on oligohydramnios but without diabetes.

CONCLUSION

The non-invasive Ultrasound (US) is highly effective in measurements of AFV in diabetic pregnancy. The woman with GDM was threatened with AF disorders more than a woman with DM. Also, women with abnormal Amniotic Fluid Volume has more risk to deliver by (CS).

Limitations

In this study there were limitations. Firstly, the small number of samples that effected on the accuracy and specificity of the results. Secondly, there was a delay in hospitals procedures by the central board for accreditation of healthcare institutions (CBAHI) which resulted to delay in collecting the data. There was some data in the hospital files and other data in the computer that makes shortage of some patient information's.

Recommendations and future directions

Farther studies should be conducted in a larger sample size. More researches are needed to evaluate the AFV disorders among Saudi diabetic pregnant. There is a need to explore public awareness of gestational diabetes mellitus (GDM) among Saudi pregnant women. Also, it is better to use AFI and maximum vertical pocket together to detect more accuracy and evaluation of amniotic fluid volume.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

First and second author designed the study, third, fourth, fifth and sixth authors performed the experiments, wrote the manuscript, collected the data, and analysed it. All authors revised the manuscript, read and approved the final version.

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